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LEXICAL COHESION IN ENGLISH – INDONESIA MACHINE TRANSLATION OUTPUT: THE REALIZATION OF MANUAL POST-EDITING

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ABSTRACT

Lexical cohesion is fundamentally dependent on linguistic cohesiveness. However, whether lexical coherence remains as texts are translated from English into Indonesian has yet to be determined. Considering this, the purpose of this study was to characterize the structure of the lexical cohesion in English-Indonesia Machine Translation (MT), and Post-Editing (PE) outputs and determine whether there were any differences in the use of lexical cohesion. A qualitative descriptive study was conducted. The fifth book in J.K. Rowling's (2013) Harry Potter and the Order of the Phoenix contains the data used in this study. Baker's (2018) equivalence at the word, above word, grammatical, and textual level, and Halliday & Matthiessen (2014) model of lexical cohesion were used to analyze and interpret the data. It was found that there aren't many differences between the lexical cohesion used in the ST, MT, and PE. While the study explores the application of lexical cohesion, additional problem equivalences, such as those at the word and above-word levels, are added to the PE recommendation.

Keywords: *Lexical Cohesion, Translation, Machine Translation, Post-Editing*

INTRODUCTION

Recent developments in machine translation (MT) have reignited interest in the applications of this technology. As machine translation looks to be moving from the periphery of the translation field closer to the center, this development raises concerns about the contribution of humans and machines (Koponen, 2016). MT is also improving at translating with grammatical and lexical accuracy (Groves, & Mundt, 2015). However, Sutrisno, (2020) found that even though sentences can still be translated well by Google Translate (GT), it still has trouble translating sentences from English to Indonesian. Thus, although MT has improved in terms of quality in several linguistic areas, further research is still needed.

The studies applied to investigate MT output are based on different theoretical and methodological prerequisites. Brazil et al. (2016) researched to evaluate whether there are substantial differences in Chinese-to-English translation efficiency between moderate to higher-level human translators and frequently used free machine translation systems. To determine the difficulties that could have a detrimental effect on the reliability of machine translation systems, Omar & Gomaa (2020) assess the value of applying machine translation systems to literature. Almaaytah (2022) investigates the necessary skill sets for post-editors and the potential for creating a course to teach the fundamental skill sets at the university level. Yet, a wider variety of research tasks are urgently needed since globalization has made it simpler for people to read writings on numerous subjects in unfamiliar languages. Accordingly, translation has grown to be a crucial field.

Lexical cohesion is one of the essential linguistic elements that make sentences in a text relate to one another (Baker, 2018). Furthermore, Billy and Chunyu (2012) found that the quality of MT output increases with the number of lexical cohesion devices used. Thus, lexical cohesion devices can be used to assess the results of MT. However, the usage of lexical cohesion in post-editing (PE) has not yet been clarified, especially in English-Indonesia GT output. Thus, this study explores the use of lexical cohesion in the English Source Text, Indonesian GT outputs, and PE outputs.

REVIEW OF THE LITERATURE

The ideas presented in this section are Lexical Cohesion in Translation, Machine Translation Output, and Manual Post-Editing.

Lexical Cohesion in Translation

The network of lexical, grammatical, and other connections between various textual elements is referred to as cohesion. Baker (2018) states that cohesiveness is a phrase used to explain the connections between meanings inside a text and define it as a text. According to Halliday & Matthiessen (2014), cohesion refers to a group's lexico-grammatical systems that have their roots in textual metafunction. Concerning the relationship between translation and cohesion, Lonsdale (1996) contends that cohesive devices represent the rhetorical goal and regulate the interpretation of the text. Thus, translators must consider these devices when adapting texts from one language to another.

Lexical cohesion describes the function of language choice in structuring relationships within a text. Reiteration and collocation are the two basic categories in lexical coherence. As the name implies, repetition entails repeating lexical items. A

reiteration of a previous item, a synonym or nearly synonym, a superordinate, and a general word are all examples of reiterated items (Baker, 2018). Douglas & Manqoba (2021) found that text coherence fundamentally depends on lexical cohesion. They contend that employing more synonyms will make them more cohesive to make explicit what would be seen as implicit in the target text if an equivalent lexical item is employed. Xiong et al. (2013) offer three distinct approaches to capture lexical cohesion for document-level machine translation. They combine the three models into hierarchical phrase-based machine translation and assess their performance using extensive training data on the NIST Chinese-English translation tasks. The experiment's findings demonstrate that all three models could significantly outperform the baseline, with the mutual information trigger model outperforming the others. Astari, N. (2019) attempts to characterize the translation equivalent of the lexical cohesion observed in The Adventures of Sherlock Holmes and to identify the impacts of a shift in cohesion and its translation. The results demonstrate that combining repetition, synonymy, near-synonymy, superordinate, generic words, and collocations contributes to the text's lexical cohesion. The novel exhibits fluctuations in cohesiveness, including shifts in the text's meaning and level of explicitness.

Machine Translation Output

Considering MT is important in many sectors, (Koponen, 2016) emphasizes the significance of learning the subject. This study suggests designing and creating a post-editing course where learning about MT is a key and major module. To determine the difficulties that could significantly affect the reliability of machine translation systems, Omar & Gomaa (2020) assess the value of applying machine translation systems to literature. Two translation tools—Google Translate and Q Translate—have been chosen. To pinpoint the issues with these translations, human-made Arabic and automatic translations produced by the two machine translation systems were compared. Results show that users make various lexical, structural, and pragmatic errors that negatively impact the accuracy of the translations.

The world of translation has unavoidably moved into a phase of intense human-machine interaction because of the continued growth of translation technologies, especially MT. Kevin (2020) uses empirical data on participant pauses in the postediting process to investigate the relationship between translation error categories and cognitive effort. It has been discovered that the length of text where an error is located is positively connected with the cognitive effort going forward to correct it. The post-editing of machine-translated

texts is gradually becoming a component of the translation workflow, sparking new research interests, as shown by (Koponen, 2016) overview of the use of machine translation, post-editing, and research on these issues. Thus, the expanding practical application implies that machine translation and post-editing have been beneficial in various settings.

Manual Post-Editing

Post-editing is how human beings adjust machine-translated texts to get a usable result. It is possible to approach manual post-editing in a way that simplifies the process and allows firms to realize substantial benefits (Guzma'n, R., 2018). In addition, it is found that PE is the procedure of taking a pre-translated text as a foundation and enhancing it to the final translation (Herbig et al., 2019). Furthermore, Popović, (2018) suggests that PE is a work operation that skilled humans must carry out but given that human processing is always necessary. Thus, PE undeniably offers advantages.

Due to the quality being below acceptable standards, the translation product would have required extensive post-editing to fit the text's purpose (Alta et al. 2012). Kevin K. Hu (2020) uses empirical data on participant pauses in the postediting process to investigate the relationship between translation error categories and cognitive effort, it has been discovered that the length of text where an error is located is positively connected with the cognitive effort to correct it. In addition, to prepare expert post editors at the university level, Almaaytah (2022) advises that creating a post-editing course becomes a priority. Hence, the goal is to raise the output quality of MT by PE to different degrees in accordance with the intended usage of the target text. Therefore, PE can be used in cooperation to improve MT output.

METHODOLOGY

This study is intended to be descriptive in nature. The descriptive qualitative research method is suited for this study because its goal is to identify the use of lexical cohesion in the Source text, GT, and PE outputs. Chapter four of the fifth book in J.K. Rowling's (2013) *Harry Potter and the Order of the Phoenix* series was chosen purposively as the data source. The data were in the form of sentences taken from *LFAligner* software of English-Indonesia GT and PE outputs. The data are first translated by google translate and post-edited by the researchers. Baker's (2018) equivalence at the word, above word, grammatical, and textual level, and Halliday & Matthiessen (2014) model of lexical cohesion were used to analyze and interpret the data.

FINDINGS AND DISCUSSION

The eight samples from the pertinent text that make up the study's data are all related to the topic of the discussion. The researchers analyzed by identifying the cohesive devices featured in the pertinent section of the text and then discussing their textual and discourse roles in terms of how they assisted in conveying the text's meaning.

Table 1. Reiteration (Repetition)

Source	GT	Post-Editing
He pulled **the piece of parchment** out of Harry's hand and set fire to **it** with **his** wand-tip.	**Dia** menarik **perkamen itu** dari tangan Harry dan membakar**nya**[1] dengan ujung tongkat**nya**[2]**.**	Acceptable GT output

Table 1 shows that the source text has the repetition of *'he' – 'his'* and *'the piece of parchment' – 'it'*. According to the sentence cohesion, the readers know that *'his'* is the repetition of *'he'*, and *'it'* is the repetition of *'the piece of parchment*." Here, the same morphological shape is unnecessary for a lexical item to be identified as repeated (Halliday & Matthiessen, 2014). Equally, the GT output shows the repetition of *'he'/dia' – 'his'* - *nya'*, and *'the piece of parchment'/'perkamen itu' – 'it'/nya'*. If the translation output is already grammatically acceptable and the style adjustment will not significantly expand its meaning, it may be unnecessary to post-edit (Guzma'n, R., 2018). Therefore, the translation output, in this case, does not require post-editing.

Table 2. Reiteration (Synonym/Near Synonym)

Source	GT	Post-Editing
They were standing outside number eleven; he **looked** to the left and **saw** number ten; to the right, however, was number thirteen.	Mereka berdiri di luar nomor sebelas; dia **melihat** ke kiri dan **melihat** nomor sepuluh; ke kanan, bagaimanapun, adalah nomor tiga belas.	Mereka berdiri di depan rumah nomor sebelas; dia **melihat** ke kiri dan **tampak** rumah nomor sepuluh; Ketika melihat ke kanan, anehnya, rumah tersebut bernomor tiga belas.

Table 2 shows that the source text has the synonym of *'looked' – 'saw'*. The GT output does not have the synonym of *'looked' – 'saw'*, which is only 'melihat' for both translated words. The post-editing shows the synonym/near-synonym of *'looked' – 'saw'*, which is *'melihat'/'tampak'*. The selection of a lexical item that is nearly synonymous with a lexical item that comes before it leads to lexical cohesion (Halliday & Matthiessen, 2014). Xiong also finds, at. al. (2013) that the complexity of computing synonym terms

increases with the size of the near-synonym collection. In this excerpt, there is also post-editing in the equivalence at the word level*; 'outside/di luar/di depan,'* and '*however/bagaimanapun/anehnya*.'

Table 3**.** Reiteration (Superordinate)

Source	**GT**	**Post-Editing**
Harry thought, and no sooner had he reached the part about number twelve, **Grimmauld Place**, than a battered **door** emerged out of nowhere between numbers eleven and thirteen, followed swiftly by dirty **walls** and grimy **windows**.	Harry berpikir, dan tidak lama setelah dia mencapai bagian tentang nomor dua belas, **Grimmauld Place**, sebuah **pintu** rusak muncul entah dari mana antara nomor sebelas dan tiga belas, diikuti dengan cepat oleh **dinding-dinding** yang kotor dan **jendela-jendela** yang kotor.	Harry merenung, dan saat dia hampir mengingat rumah nomor dua belas, **Grimmauld Place**, tiba-tiba sebuah **pintu** reyot muncul diantara rumah nomor sebelas dan tiga belas, diiringi dengan penampakan **sekeliling dinding** dan **jendela-jendela**nya yang kotor.

Table 3 shows that the source text has the superordinate of *'Grimmauld Place'*, ' *door', 'walls',* and *'windows.'* Equally, the GT output and the post-editing show the superordinate of *'Grimmauld Place'*, which are *'door/pintu', 'walls/dinding',* and *'windows/jendela*. Superordinates are considered cohesive elements (Halliday & Matthiessen, 2014). Astari, N. (2019) also found that through a series of repetitions and superordinates, the lexical cohesiveness of the text is developed. Although there are some editing in the equivalence at the word level; '*thought/berfikir/merenung,' 'battered/rusak/reyot,' 'followed/diikuti/diiringi,' 'swifly/dengan cepat/penampakan*,' and the equivalence above word level; *'and no sooner had he reached the part about number twelve/tidak lama setelah dia mencapai bagian tentang nomor dua belas/ dan saat dia hampir mengingat rumah nomor dua belas'*, and also in the grammatical equivalence; *walls/dinding-dinding/sekeliling dinding,* and *windows/jendela-jendela/jendela-jendelanya,* the GT output and post-editing practically show no difference in reiteration of lexical cohesion.

Table 4. Reiteration (General Word)

Source	**GT**	**Post-Editing**
`Get in quick, Harry,' Lupin whispered, `but don't go far inside and don't touch **anything**.	`'Cepat masuk, Harry,' bisik Lupin, 'tapi jangan masuk jauh ke dalam dan jangan sentuh **apa pun**.	'Cepat masuk, Harry,' bisik Lupin, 'tapi jangan masuk terlalu jauh dan jangan sentuh **apa pun**.

Table 4 shows that the source text has the general word *'anything'*. Equally, the GT output and the post-editing show the general word '*apa pun'*. Here, generality is present in cohesive items (Halliday & Matthiessen, 2014). In comparing Lexical Cohesion between English and Persian Novels, Rahimi & Ebrahimi (2012) found that Persian novels contain a significantly higher number of pairs with a generalization. Although there is editing in the above word level; '*don't go far inside/jangan masuk jauh ke dalam/jangan masuk terlalu jauh*,' the GT output and post-editing practically show no difference in reiteration of lexical cohesion.

Table 5. Collocation (Oppositeness)

Source	**GT**	**Post-Editing**
Moody was standing on the top step releasing the balls of light the Put-Outer had stolen from the streetlamps; they flew back to their bulbs and the square **glowed** momentarily with orange light before Moody limped inside and closed the front door, so that the **darkness** in the hall became complete.	Moody berdiri di anak tangga teratas melepaskan bola-bola cahaya yang dicuri Put-Outer dari lampu jalan; mereka terbang kembali ke bohlam mereka dan alun-alun itu **bersinar** sejenak dengan cahaya oranye sebelum Moody tertatih-tatih masuk dan menutup pintu depan, sehingga **kegelapan** di aula menjadi lengkap.	Moody bertengger di anak tangga paling atas untuk melepaskan bola-bola cahaya yang dicuri oleh Put-Outer dari lampu-lampu jalan; mereka terbang kembali ke bohlamnya. Sejenak ruangan itu **bercahaya** jingga sebelum Moody tertatih-tatih masuk dan menutup pintu depannya, sehingga tempat itu Kembali menjadi **gelap-gulita**.

Table 5 shows that the source text has the opposite of *'glowed/darkness'*. Equally, the GT output and the post editing show the oppositeness of *'glowed/darkness', 'bersinar/kegelapan', 'bercahaya/gelap-gulita'*. Antonyms also have a cohesive function in a text (Halliday & Matthiessen, 2014). In demonstrating the use of lexical cohesive techniques by L2 writers, Uneke & Chiekpezie (2019) revealed that an antonym was one of the lexical devices used to make the writing fluid, interesting, and natural. Thus, the antonym for '*glowed-darkness'* post-editing here uses a near-synonym for *'glowed'/'bersinar'*, with *'bercahaya'*, '*was standing/berdiri/bertengger,'* and *'darkness'/'kegelapan'*, with *'gelap-gulita'* since those words are more natural in their contexts. There are also editing in the equivalence at the word level; '*top/teratas/paling atas*,' and '*orange/oranye/jingga,'* and the equivalence at theme – rheme; '*the square glowed momentarily/ alun-alun itu bersinar sejenak/Sejenak ruangan itu bersinar,'* and *'so that the darkness in the hall became complete/sehingga kegelapan di aula menjadi lengkap/sehingga tempat itu Kembali menjadi gelap-gulita.'*

Table 6. Collocation (words from the same ordered series)

Source	GT	Post-Editing
They were standing outside **number eleven**; he looked to the left and saw **number ten**; to the right, however, was **number thirteen**.	Mereka berdiri di luar **nomor sebelas**; dia melihat ke kiri dan melihat **nomor sepuluh**; ke kanan, bagaimanapun, adalah **nomor tiga belas**.	Mereka berdiri di depan rumah **nomor sebelas**; dia melihat ke kiri dan tampak rumah **nomor sepuluh**; Ketika melihat ke kanan, anehnya, rumah tersebut **bernomor tiga belas**.
`But where's -?	'Tapi di mana --?	Acceptable GT output

Table 6 shows that the source text has the words from the same ordered series of '*number eleven', 'number ten'*, and *'number thirteen'*. Equally, the GT output and the post editing show the words from the same ordered series; '*nomor sebelas/ nomor sebelas, nomor sepuluh/nomor sepuluh*, and *nomor tiga belas/ nomor tiga belas/ bernomor tiga belas.*' Here, Halliday & Matthiessen (2014) state that collocation is one of the things we depend on in our assumptions of what will happen next. Furthermore, Douglas, O. O. & Manqoba, V. N. (2021) found that the lexical chains in the source and target texts in their study are noticeably similar. Although there is editing in grammatical equivalence by adding the prefix *'ber'* in *'bernomor'*, the GT output and post-editing practically show no difference in the collocation of lexical cohesion.

Table 7. Collocation (words from unordered lexical sets: part-whole relations, part-part relations, and co-hyponymy)

Source	GT	Post-Editing
`You're looking peaky; you need **feeding up**, but you'll have to wait a bit for **dinner**, I'm afraid.	'Anda tampak pucat; Anda perlu **makan**, tetapi Anda harus menunggu sebentar untuk **makan malam**, saya khawatir.	'Anda tampak pucat; Anda perlu **makan**, tetapi, sepertinya anda harus menunggu sebentar untuk **makan malam.**

Table 7 shows that the source text has the part-part relations of *'feeding up'* and *'dinner'.* A situation where two lexical units are connected within the language is viewed as a collocation (Baker, 2018). This relation has helped to connect the phrases and let the text flow as a single piece (Malah, et al. 2016). Equally, the GT output and the post-editing show the same part-part relations; *'feeding up/makan/makan*,' and '*dinner/makan malam/makan malam.*' Although there is editing in the above word level; '*I'm afraid/saya khawatir/sepertinya,'* the GT output and post-editing show practically no difference in the collocation of lexical cohesion.

Table 8. Collocation (collocation proper)

Source	GT	Post-Editing
Sorry about that, but I wanted answers, you know -	**Maaf soal itu**, tapi aku ingin jawaban, kau tahu --	**Maaf soal itu**, tapi aku ingin jawaban, kau tahu --

Table 8 shows that the source text has the collocation proper of *'sorry about that.'* Identifying a collocational proper with a similar meaning and form in the target language might be the most effective approach (Baker, 2018). So, the GT output and the post editing here show a similar collocation proper of *'sorry about that/maaf soal itu/maaf soal itu',* which means they show practically no difference in the collocation of lexical cohesion.

Discussion

Machine translation makes it possible for anyone to translate between languages without the help of a professional, making it straightforward for them to comprehend content written in languages they do not speak fluently. MT, like Google Translate, assists translators in navigating linguistic distinctions to obtain information and gain a new understanding of a foreign language. Additionally, it makes it easier for qualified translators to publish their work and helps readers comprehend concepts expressed in other languages. However, translators should employ PE to produce high-quality output, as suggested by Guzma'n, R. (2018); Douglas & Manqoba (2021); Herbig et al. (2019); Popović (2018); Alta et al. (2012); and Almaaytah (2022). They contend that PE can be used to improve MT output.

The result of this study shows no differences in lexical cohesion used in the ST, MT, and PE outputs. Overall, it can be said that the ST, MT, and PE have similar levels of lexical coherence. On the other hand, the problems are mostly found in the word and above word-level equivalences. Post-editing is, however, considered necessary in this case to enhance the result of the machine translation in both equivalences.

CONCLUSION

This study identified the network of lexical cohesion in the source and target texts by manual post-editing analysis. It was discovered that the lexical cohesion employed in the ST, MT, and PE, are similar. Overall, the lexical cohesion of the English text, Indonesian MT, and PE could be stated to be very comparable. The results provide English-Indonesia translators with important information on how to create text cohesion and the effects that changes in lexical cohesion have on text coherence. Therefore, it is important for translators to utilize lexical cohesion devices that allow the target reader to understand and

accept the translated version of the source text. Other problem equivalences, such as those at the word and above-word levels, are added to the PE recommendation while the study examines the usage of lexical cohesion. Further research must examine how translators handle equivalences at the word and above-word levels during the post-editing process.

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